Application Serial No. 10/539,731
Reply to office action of June 24, 2008

PATENT
Docket: CU-4274

Amendments To The Claims

· The listing of claims presented below will replace all prior versions, and listings, of claims in the application.

Listing of claims:

1.   **(currently amended)** A protocol embodying system converting user data into IP packets and converting IP packets into user data **for mobile station communications across various networks**, the protocol embodying system in GGSN including a GPRS (general packet radio service) network which includes protocols of first and second network layers, and a protocol of a transfer layer wherein a PDN (public data network) is connected to the GPRS network in which the PDN uses the protocols of the first and second layers to transmit the IP packets to the outside or the GPRS network, the protocol embodying system comprising:

an IP layer provided between the GPRS network and the PDN, for performing **inter-network** routing between the two networks, and performing **intra-network** routing between the protocols of the first and second network layers and the transfer layer protocol on the GPRS network;

a GPRS tunneling protocol unit (GTP-U) **interfaced to the IP layer, the GTP-U** converting back and forth the IP packets into tunnel messages using a GPRS tunneling protocol **and intra-network transmitting back and forth the tunnel messages using the IP layer between the GTP-U and the GGSN**; and

a virtual driver provided on the lower part of the IP layer for performing **inter-network** routing of IP packets back and forth to the PDN via the IP layer and performing

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routing IP packets back and forth to the ~~GPRS tunneling protocol unit~~ GTP-U from

the virtual driver wherein the virtual driver is operable as the lower interface of the IP

layer.

2.   (original) The protocol embodying system of claim 1, wherein the virtual driver is

connected to the IP layer so that the IP packets are output to the PDN through the

protocols of the first and second layers of the PDN when the data transmitted from the

GPRS network are passed through the protocols of the first and second network layers

and converted into the IP packets through the IP layer, the transfer layer, and the GPRS

tunneling.

3.   (original) The protocol embodying system of claim 1, wherein the virtual driver is

connected to the IP layer so that the IP packets are output to the GPRS network

through the tunneling protocol of the GPRS network, the transfer protocol, the IP layer,

and the protocols of the first and second layers when the IP packets transmitted from

the PDN are transmitted to the IP layer through the protocols of the first and second

layers.

4.   (original) The protocol embodying system of claim 1, wherein the virtual driver

performs a reporting process with the IP in advance in order to process the dynamic

and static addresses of the mobile stations belonging to the GGSN during the process

of transmitting the IP packets provided from the PDN to the GPRS network.

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5.   **(currently amended)** A protocol embodying method in [[the]] a_GGSN

converting user data into IP packets and converting IP packets into user data **for**

mobile station communications across various networks, comprising:

when receiving a first data unit at a GGSN from a GPRS network, transforming

the first data unit into first tunneled message, and **intra-network** transmitting the first

tunneled message using protocols of first and second layers of the GPRS network [[to]]

through an IP layer **to a GPRS tunneling protocol unit (GTP-U); [[,]]**

allowing tunneling of the first tunneled message to be canceled at [[a]] **the GTP-**

U GPRS tunneling protocol using a protocol of a transfer layer so that a first IP packet

is generated from the first tunneled message to be directed to a virtual driver is

generated;

inter-network transmitting the first IP packet to the IP layer through **from** the

virtual driver, and allowing the IP layer to **inter-network** transmit the first IP packet to a

corresponding node on [[a]] **the** public data network (PDN); [[and]]

allowing the PDN to output the received first IP packet to the outside through

protocols of the first and second layers **and to inter-network transmit a second IP**

packet to the IP layer; and

inter-network receiving the second IP packet from the IP layer with the

virtual driver.

6.   **(currently amended)** A protocol embodying method in a GGSN converting user

data into IP packets and converting the IP packets into user data **for mobile station**

communications across various networks, comprising:

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[[when]] inter-network receiving an IP packet using a virtual driver of [[at]]

the GGSN an emitted IP packet from a PDN (public data network) from , emitting the

IP packet to an IP layer through protocols of first and second layers; transmitting

the emitted IP packet to a virtual driver, and

allowing the virtual driver to transmit the emitted IP packet to a GPRS tunneling

protocol unit (GTP-U) of the GPRS network; [[and]]

converting the transmitted IP packet into a tunneled message; [[,]] and

Intra-network outputting the tunneled message to the GPRS network through a

transfer layer protocol, the IP layer using [[, and]] protocols of the first and second

layers,

wherein the tunneled message is converted into user data through the transfer

layer, the IP layer, and the protocols of the first and second layers.

7.   (currently amended)   The protocol embodying method of claim 6, wherein

further comprising the step of allowing the virtual driver to inter-network transmit the

IP packet [[to]] through the IP layer after the virtual driver performs in (b)

comprises performing a reporting process with the IP layer in advance so that the

virtual driver may process dynamic and static addresses of mobile stations belonging to

the GGSN.

8.   (previously presented)   The protocol embodying method of claim 5 further

comprising:

allowing the virtual driver to perform routing of [[a]] the second IP packet from

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the outside to the <u>GTP-U</u> ~~protocol of the transfer layer~~;

converting the second IP packet into a second tunneled message using the <u>GTP-U</u> and <u>intra-network</u> transferring the second tunneled message through the IP layer to the GPRS network; and

transforming the converted second tunneled message into a second data unit using the GPRS network.

9.   (previously presented) The protocol embodying method of claim 6 further comprising:

when acquiring another user data at the GGSN from the GPRS network, <u>intra-network</u> sending out another message <u>from the GGSN</u> by tunneling the another user data into the another message using protocols of first and second network layers of the GPRS [[to]] <u>through</u> the IP layer <u>to the GTP-U</u>, allowing tunneling of the another tunneled message to be canceled at the ~~GPRS tunneling protocol through the transfer layer protocol~~ <u>GTP-U</u> to generate another IP packet to be directed to the virtual driver and <u>inter-network</u> routing the another IP packet [[to]] <u>through</u> the IP layer with the virtual driver; and

<u>inter-network</u> transmitting the another IP packet [[to]] <u>through</u> the IP layer using the virtual driver, and allowing the IP layer to <u>inter-network</u> transmit the another IP packet to a corresponding node on PDN.